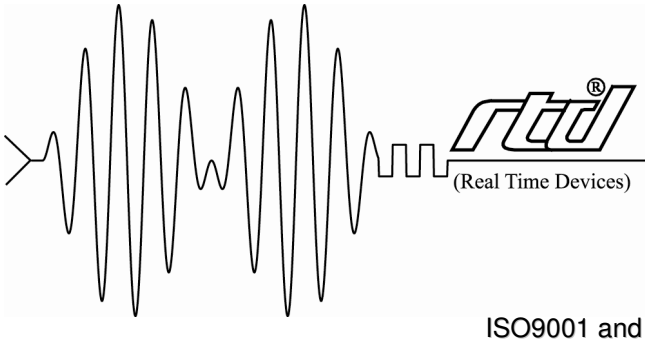
CM17320HR User's Manual

Octal RS-232/422/485 PC/104-Plus Module



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Rev E

ISO9001 and AS9100 Certified

CM17320HR User's Manual

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Manual Revision History

Rev A	New manual
Rev B	Added User Oscillator
Rev C (01/31/2008)	Added a section about supported baud rates. Added a diagram of the User Oscillator. Added information about COM port numbering in Windows. Added section on COM port enumeration for application developers.
Rev D (08/13/2008)	- Added the IDAN-CM17320 Dimensions and Pinout section, which replaces the (previously separate) IDAN Manual, IDM-650020032. - Corrected the IDAN connector pinout, which was listed incorrectly in IDM-650020032 rev A. - Added information about RTD pre-installed User Oscillators - Expanded the board block diagram to clarify the oscillator operation - Renamed the jumper designations for the signal conditioning jumpers. They now use the designations printed on the board silk, rather than the JPxx designation from the schematic. - Improved the Connector and Jumper Locations diagram. - Changed the name of the RS-422/485 Transmitter control section to more accurately indicate its purpose.
Rev E (8/17/2009)	- Added spec for External clock input - Added second mode jumper to get RS-422 with drivers always enabled and RS-485 with inverted RTS driver enable modes in addition to RS-232 and RS-422/485 (now just RS-485 mode) with RTS driver enable modes

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Introduction

Product Overview

The CM17320HR is designed to provide eight independent PCI serial ports with RS-232, RS-422, or RS-485 interfaces for PC/104-*Plus* based systems.

Board Features

- Eight versatile serial port interfaces
  - Jumper-selectable RS-232, RS-422 drivers always enabled, RS-485 with RTS driver enable and RS-485 with inverted RTS driver enable operation
  - Supports all standard RS-232 serial port signals (RTS, CTS, etc).
  - Functionally compatible with standard PC 16C550 UARTs
- Exar XR17D158 Octal PCI UART
  - 32-bit PCI target
  - 16C550 compatible 5G register set
  - 64 byte transmit and receive FIFOs
  - Programmable date rate with prescaler
  - 14.7456 MHz crystal
  - Standard PC serial port baud rates supported
  - Up to 921,600 baud RS-422/485 (prescaler = 1)
  - Up to 230,400 baud RS-232 (prescaler = 4)
- User oscillator option
  - Enables support for non-standard baud rates up to 6.25 Mbps
  - +3.3 V or 5 V Oscillators, 50 MHz max
  - 8-pin DIP package (4 pins used)
  - Board may be ordered with a custom oscillator preinstalled.
- PC/104-*Plus* compliant
  - Universal (3.3V or 5.0V) PCI signaling

I/O Interfaces

- Eight 10-pin DIL serial port connectors
  - 0.1” Pin Spacing
  - Can be cabled directly to a 9-pin “D” connector
- PC/104-*Plus* (PCI) stack-through bus connector
- PC/104 (ISA) stack-through bus connector

Available Options

The CM17320HR may be purchased as either a board-level product, or as an IDAN module for integration into an RTD IDAN system. Cable kits are also available.

Part Number	**Description**
CM17320HR	Octal Serial Port Peripheral Module
CM17320HR-xxx.xxxMHz	CM17320HR with pre-installed oscillator for custom baud rates *(xxx.xxx specifies the frequency)*

XK-CM30	Quad Serial Port Cable Kit *(To connect all 8 ports, purchase two XK-CM30s)*
IDAN-CM17320HRS	CM17320HR mounted in an IDAN frame *May also specify a custom oscillator frequency.*
IDAN-CM17320HRS/xxx.xxxMHz	IDAN-CM17320HRS with pre-installed oscillator for custom baud rates *(xxx.xxx specifies the frequency)*
IDAN-XKCM33	IDAN Multi Serial Port Cable (4 ports) *(To connect all 8 ports, purchase two IDAN-XKCM33s)*

In addition to the above ordering options, RTD can also provide the CM17320HR with various customizations (e.g. conformal coating, custom connectors, soldered jumpers, etc). Contact RTD's sales department (sales@rtd.com) for more information.

Getting Technical Support

If you are having problems with your system, please try the following troubleshooting steps:

- **Simplify the System** – Remove modules one at a time from your system to see if there is a specific module that is causing a problem.
- **Swap Components** – Try replacing parts in the system one-at-a-time with similar parts to determine if a part is faulty or if a type of part is configured incorrectly.

If problems persist, or you have questions about configuring this product, obtain the PCI BIOS listing information of the CM17320HR and other modules in the system. After you have this information, contact RTD Embedded Technologies via the following methods:

Phone: +1-814-234-8087

E-Mail: techsupport@rtd.com

Be sure to check the RTD web site (http://www.rtd.com) frequently for product updates, including newer versions of the board manual and application software.

Hardware Description

Block Diagram

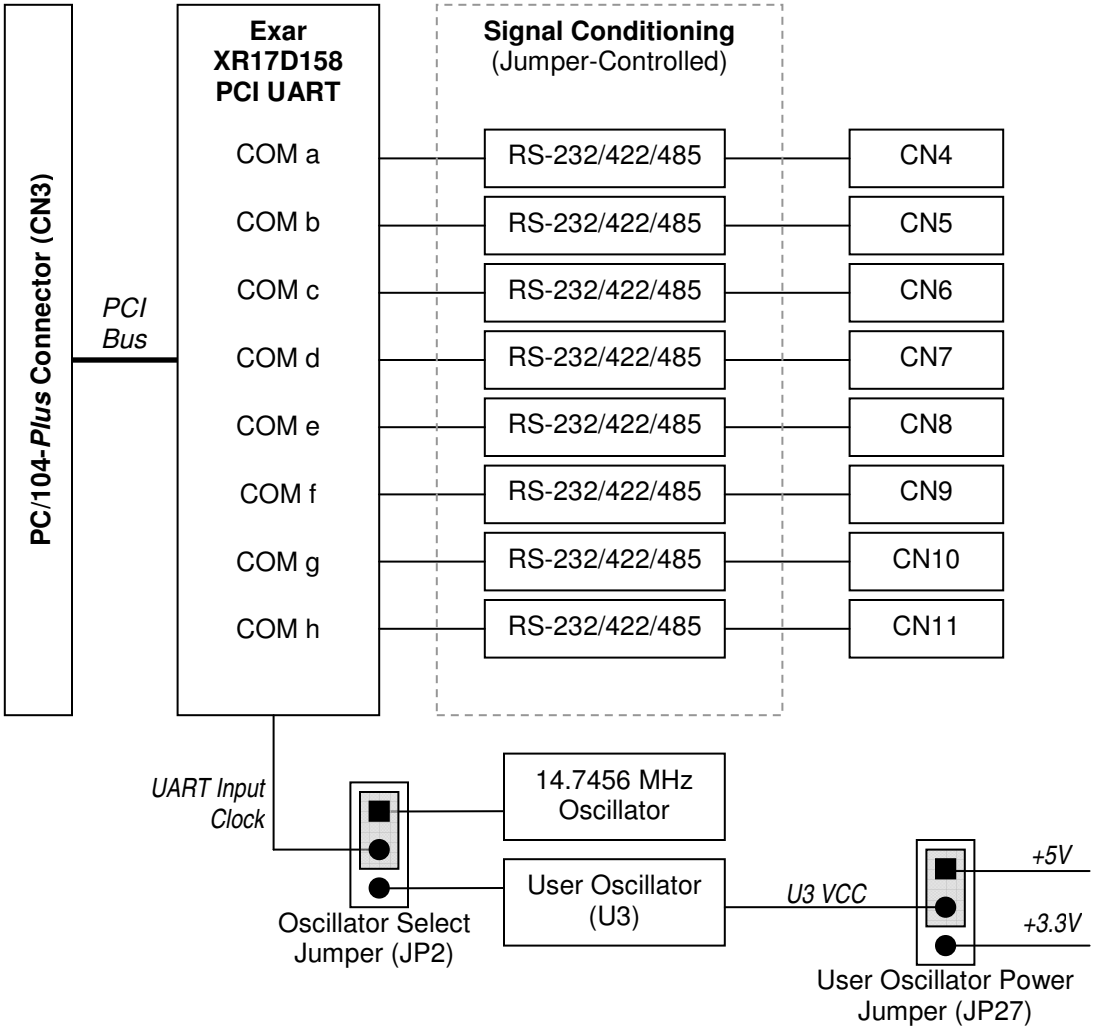


Figure 1 CM17320 Block Diagram

Supported Baud Rates

When using the standard 14.7456 MHz oscillator, the CM17320HR supports the standard baud rates of PC serial port (e.g. 2400, 9600, 19.2k, etc). The CM17320HR can also support non-standard baud rates via a User Oscillator.

The baud rate of a serial port is set by dividing the input clock (typically 14.7546MHz). For the Exar XR17D158, there are two dividers to specify. First is the Prescaler (MCR Bit 7), divides the input clock by either 1 or 4. Second is the Baud Rate Generator, which further divides the frequency further to achieve the desired baud rate. The Baud Rate Generator can be set to a value between 1 and (2^{16}-1).

Note: For more information on programming the Prescaler and Baud Rate Generator, consult the XR17D158 datasheet.

The Baud Rate Generator divisor can be calculated by one of the following equations depending on sampling of receiver of 8 or 16:

Divisor = (INPUT_CLOCK / PRESCALER) / (DESIRED_BAUD_RATE x 16)

or

Divisor = (INPUT_CLOCK / PRESCALER) / (DESIRED_BAUD_RATE x 8)

For example, if one wants to use a baud rate of 115.2K, Prescale divisor of 4, and receiver sampling of 16, the Baud Rate Generator divisor would be:

(14745600 / 4) / (115200 x 16) = 2

If the desired baud rate can not be expressed as a whole number divisor, it may be necessary to use a different input clock. This can be done with a User Oscillator. A user-specified oscillator can be installed in U3. The max frequency for the user oscillator is 50 MHz and the max baud rate for the chip is 6.25 Mbps. Alternatively, RTD can preinstall several common oscillator frequencies.

Board Connections

Connector and Jumper Locations

The following diagram shows the location of all connectors and jumpers on the CM17320HR. Future revisions of the CM17320HR may have cosmetic differences. For a description of each jumper and connector, refer to the following sections.

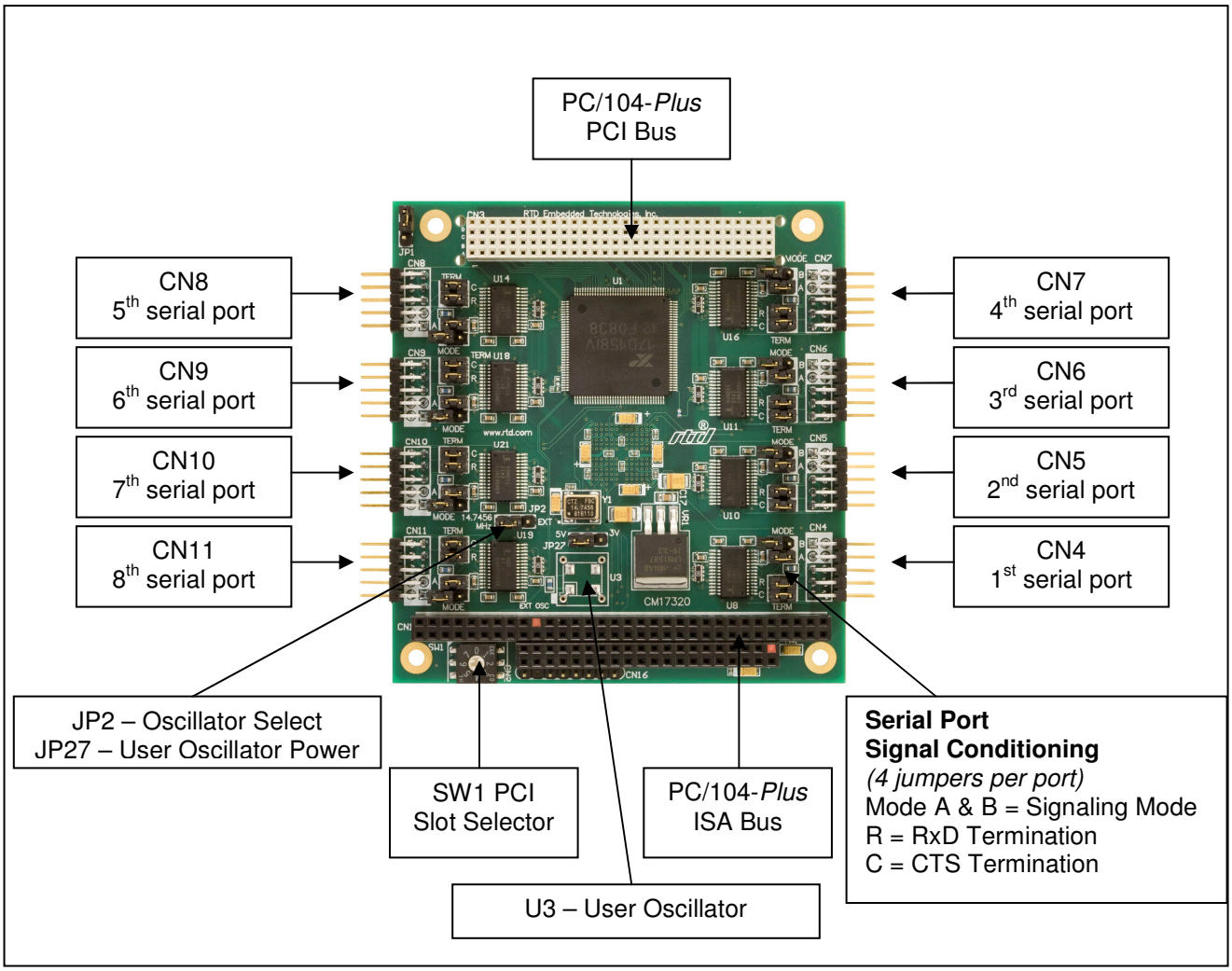
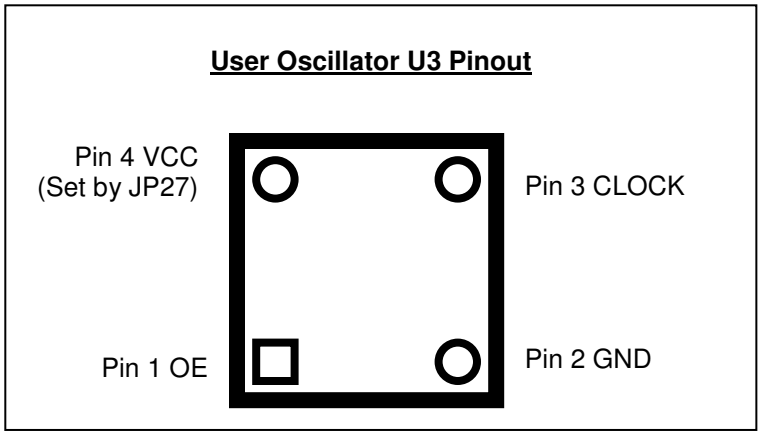


Figure 2 – CM17320 Connector and jumper locations

User Oscillator, U3

The board has a position for a half size, 8-pin DIP, user oscillator. This device can be either a 5 volt or 3.3 volt oscillator and is configured with jumper JP27. Jumper JP2 selects either the 14.7456 MHz oscillator or the user oscillator. All serial ports use the same oscillator. U3 pin 1 is

pulled high with a 10K ohm resistor to enable tri-state oscillators. The max frequency is 50MHz which will result in a max baud rate of 6.25Mbps.



Serial Port Connectors, CN4-CN11

The following sections describe the external I/O connections of the CM17320HR board. For information on the I/O connections for the IDAN version, refer to the IDAN-CM17320HRS section later in this manual.

First serial port, CN4

The first serial port is implemented on connector CN4. It can be configured as a PC compatible full duplex RS-232 port, full duplex RS-422 with drivers always enabled, RS-485 with RTS driver enable, or RS-485 with inverted RTS driver enable by the “Mode A and B” jumpers. See Table 5 – Jumper Settings for details.

RS-232 Serial Port Mode (Default)

The full-duplex RS-232 mode is the default setting on the utilityModule. With this mode enabled, connector CN4 must be connected to RS-232 compatible devices. The following table gives the connector pinout and shows how to connect to an external serial connector, either DB25 or DB9.

Table 1 Connector CN4 in RS-232 Mode (I)

CN4 Pin	Signal	Function	In/out	DB25	DB9
1	DCD	Data Carrier Detect	In	8	1
2	DSR	Data Set Ready	In	6	6
3	RXD	Receive Data	In	3	2
4	RTS	Request To Send	Out	4	7
5	TXD	Transmit Data	Out	2	3
6	CTS	Clear To Send	In	5	8
7	DTR	Data Terminal Ready	Out	20	4

8	RI	Ring Indicate	In	22	9
9,10	GND	Signal Ground	--	7	5

Facing the connector pins, the pinout is pictured in the following,

Table 2 Connector CN4 in RS-232 Mode (II)

9	7	5	3	1
GND	DTR	TXD	RXD	DCD
GND	RI	CTS	RTS	DSR
10	8	6	4	2

RS-422, RS-485 RTS, RS-485 Inverted RTS Serial Port Modes

When using RS-422 or RS-485 mode, you can use the port in either half-duplex (two-wire) or full-duplex (four-wire) configurations. For half-duplex (2-wire) operation, you must connect RXD+ to TDX+ and connect RXD- to TXD-.

Note: 120-ohm termination resistors for the RxD and CTS signals are provided on the utilityModule. Termination is usually necessary on all RS-422 receivers and at the ends of the RS-485 bus. If the termination resistor is required, it can be enabled by closing jumpers labeled “R” and “C” for the corresponding port. For more information, refer to the Jumper Settings table later in this chapter.

The following table gives the pinout of connector CN4 when RS-422 or RS-485 modes are enabled.

Table 3 Connector CN4 in RS-422/485 Mode (I)

CN3 Pin	Signal	Function	In/out	DB9
1	RTS-	Request to send (-)	Out	1
2	RTS+	Request to send (+)	Out	6
3	RXD-	Receive Data (-)	In	2
4	TXD+	Transmit Data (+)	Out	7
5	TXD-	Transmit Data(-)	Out	3
6	RXD+	Receive Data (+)	In	8
7	CTS-	Clear to send (-)	In	4
8	CTS+	Clear to send (+)	In	9
9,10	GND	Signal Ground	--	5

Facing the connector pins, the pinout is pictured in the following table.

Table 4 Connector CN4 in RS-422/485 Mode (II)

9	7	5	3	1
GND	CTS-	TXD-	RXD-	RTS-
GND	CTS+	RXD+	TXD+	RTS+
10	8	6	4	2

Second serial port, CN5

Please refer to the previous section on the first COM port, CN4 for the description.

Third serial port, CN6

Please refer to the previous section on the first COM port, CN4 for the description.

Fourth serial port, CN7

Please refer to the previous section on the first COM port, CN4 for the description.

Fifth serial port, CN8

Please refer to the previous section on the first COM port, CN4 for the description.

Sixth serial port, CN9

Please refer to the previous section on the first COM port, CN4 for the description.

Seventh serial port, CN10

Please refer to the previous section on the first COM port, CN4 for the description.

Eighth serial port, CN11

Please refer to the previous section on the first COM port, CN4 for the description.

Jumper Settings

The following sections describe the jumper configuration options available on the CM17320HR. For a reference that shows the location of each set of jumpers, refer to the diagram of the CM17320HR at the beginning of this chapter. The default factory jumper settings are listed in the following table:

Table 5 – Jumper Settings

Jumper		Description	Function and Default Setting
JP1		Bypass PCI bus EEPROM	**1-2** for Normal operation (default) **2-3** Factory use only
JP2		14.7456 MHz Oscillator or User Oscillator	**1-2** 14.7456 MHz (default) **2-3** User Oscillator ***Note:*** *Be sure to set JP27 if using a User Oscillator.*
CN4	**Mode A** **Mode B**	First serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	First serial port RxD termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
	C	First serial port CTS termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
CN5	**Mode A** **Mode B**	Second serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	Second serial port RxD termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
	C	Second serial port CTS termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
CN6	**Mode A** **Mode B**	Third serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	Third serial port RxD termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
	C	Third serial port CTS termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
CN7	**Mode A** **Mode B**	Fourth serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	Fourth serial port RxD termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
	C	Fourth serial port CTS termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
CN8	**Mode A** **Mode B**	Fifth serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	Fifth serial port RxD termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination

Jumper		Description	Function and Default Setting
	C	Fifth serial port CTS termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
CN9	**Mode A** **Mode B**	Sixth serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	Sixth serial port RxD termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
	C	Sixth serial port CTS termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
CN10	**Mode A** **Mode B**	Seventh serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	Seventh serial port RxD termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
	C	Seventh serial port CTS termination in RS-422/485	**Open** No termination (default) **Closed** 120 Ohm Termination
CN11	**Mode A** **Mode B**	Eighth serial port mode	**B A Mode** **Open Open** RS-232 (Default) **Open Close** RS-485 RTS driver enable **Close Open** RS-485 RTS inv. driver enable **Close Close** RS-422 drivers enabled
	R	Eighth serial port RxD termination in RS-422/485 mode	**Open** No termination (default) **Closed** 120 Ohm Termination
	C	Eighth serial port CTS termination in RS-422/485 mode	**Open** No termination (default) **Closed** 120 Ohm Termination
JP27		User Oscillator power source selection	**1-2** +5V (default) **2-3** +3.3V

PCI Board Selector, SW1

The CM17320HR uses a rotary switch to select the PCI slot. Before you can use this module you have to set the PCI board selector switch. The procedure is if this module is the first module from the CPU module select '0,' if it is the second module select '1,' etc. Positions 4 - 7 are simply repeats of positions 0 – 3.

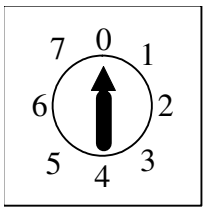


Figure 3: PCI Selector Rotary Switch PCI Board Selector

Board Installation

Installing the Hardware

The CM17320HR can be installed into a PC/104-*Plus* or PCI-104 stack. It can be located almost anywhere in the stack, above or below the CPU as long as all PCI bus constraints are met.

Static Precautions

Keep your board in its antistatic bag until you are ready to install it into your system! When removing it from the bag, hold the board at the edges, and do not touch the components or connectors. Handle the board in an antistatic environment, and use a grounded workbench for testing and handling of your hardware.

Steps for Installing

1. Shut down the PC/104-*Plus* system and unplug the power cord.
2. Ground yourself with an anti-static strap.
3. Set the PCI Slot Selector as described in the previous chapter.
4. If any other PCI add-on cards are to be included in the stack, be sure that their PCI slot numbers are configured correctly (Slot 0 for the board closest to the CPU, Slot 1 for the next board, etc).
5. Line up the pins of the CM17320's PC/104 and PC/104-*Plus* connectors with the corresponding bus connectors of the stack. Make sure that both connectors are lined up.
6. Apply pressure to both bus connectors and gently press the board onto the stack. The board should slide into the matching bus connectors. Do not attempt to force the board, as this can lead to bent/broken pins.
7. If any boards are to be stacked above the CM17320, install them.
8. Attach any necessary cables to the PC/104-*Plus* stack.
9. Re-connect the power cord and apply power to the stack.
10. Boot the system and verify that all of the hardware is working properly.

Note: If multiple PCI devices are configured to use the same PCI slot number, the system may not boot.

Installing the Software

The CM17320HR uses a PCI-based UART, not the standard ISA-based UART found in most PC motherboards. Therefore, it may be necessary to install software before the board will be recognized by the operating system. RTD provides drivers for several popular operating systems. This software is provided on disk with the board, and is also available for download from the RTD web site (http://www.rtd.com).

Note: Before installing any drivers, it is recommended that you visit the RTD web site to check for a newer version.

The actual procedure for installing the software will depend on the operating system. Consult the documentation provided with the software for installation instructions.

Once the drivers are installed, all eight ports should be available as standard serial ports (a.k.a. COM ports) to the operating system. At that point, application software should be able to access and control the serial ports.

Note: When the CM17320HR is installed under Windows, it typically uses a contiguous set of COM port numbers (e.g. COM3-COM10). If the CM17320HR is installed in a system with more than two COM ports, there may be overlap between the COM port numbers. It may be necessary to re-number the existing COM ports to avoid conflicts with the CM17320HR. Consult the Windows driver documentation for more information.

Software Programming

API Interface

Once the drivers for the CM17320HR have been properly loaded, all eight RS-232/422/485 ports should be available as standard serial ports. All eight ports can then be controlled using the standard serial port interfaces built into the operating system.

A description of serial port programming for operating systems is beyond the scope of this manual. Consult the operating system documentation for information on how to interface with serial ports via software.

COM Port Numbering

Serial ports (aka COM ports) are typically assigned numbers by the operating system (e.g. COM1). These numbers are typically dynamically assigned by the operating system. However, different applications may enumerate the COM ports differently, assigning different port numbers (e.g. COM3-10 vs COM5-12). When developing your own serial port application, consult your operating system's documentation for the proper method of enumerating COM ports.

Note: Some applications are written to assume that no more than four COM ports are present in a system. These applications may have compatibility issues with the Exar PCI UART.

Base Address and Register Mapping

The CM17320HR exposes all of the registers available on the Exar XR17D158. The register set of the XR17D158 mimics the standard 16C550 UART register map. However, the XR17D158 contains some additional registers not found in a typical ISA-based UART.

Additionally, the base address of the CM17320HR's serial ports will be different than the standard PC serial port locations (0x3F8, 0x2F8, etc). The CM17320HR is a memory mapped device. Since it is PCI-based, it may be mapped to any location within the 4GB address space of the CPU. The base address of PCI devices is determined by the CPU's BIOS and operating system at boot time.

The register-level differences between the CM17320HR and a standard 16C550 UART should be abstracted via the software drivers. Most users will not need to concern themselves with the actual registers of the board. If one is interested in directly accessing the registers of the board, consult the XR17D158 data sheet available from Exar.

Enabling the RS-422/485 Transmitter

See Table 5 – Jumper Settings for mode jumper settings. When using the serial port in RS-422 or RS-485 mode, the serial receiver for RxD (receive data) is always enabled.

In RS-422 mode the driver is always enabled, however in RS-485 mode the driver for TxD (transmit data) is enabled and disabled under software control in the following two ways.

In RS-485 RTS driver enable mode the transmitter is enabled by manipulating the Request to Send (RTS) signal of the serial port controller. This signal is controlled by writing bit 1 of the Modem Control Register (MCR) as follows:

- If MCR bit 1 = 1, then RTS = 0, and serial transmitter is disabled
- If MCR bit 1 = 0, then RTS = 1, and serial transmitter is enabled

If you are using the RS-485 inverted RTS driver enable mode these settings will be reversed as follows:

- If MCR bit 1 = 1, then RTS = 0, and serial transmitter is enabled
- If MCR bit 1 = 0, then RTS = 1, and serial transmitter is disabled

If you are using the handshaking signals in RS-422/485 mode, the serial receiver for CTS (clear to send) is always enabled, and the serial transmitter for RTS (request to send) is always enabled.

The exact software method for toggling RTS will depend on your operating system. Consult your operating system's programming documentation for information on how to do this.

"NOTE: Many serial communication programs (e.g. Windows HyperTerminal) do not assert RTS while transmitting. When using these programs, make sure jumper that enables the transmitters all the time is installed. If using a multi-drop bus such as RS485, the software will have to be modified to toggle RTS to enable the transmit drivers."

Interrupts

Since the CM17320HR is a PCI device, it is capable of sharing interrupts with other PCI devices. Interrupt sharing is a normal part of PCI operation, and a required part of the PCI specification. Note that any Interrupt Service Routines developed for the CM17320HR must be properly written to support interrupt sharing.

The CM17320HR uses one PCI interrupt for all eight serial ports. The actual IRQ number will be set by the CPU's BIOS and operating system at boot time.

Since the XR17D158 has all the capabilities of a standard 16C550 UART, it supports all of the standard serial port interrupt events. However, it will not actually generate interrupts unless the Interrupt Enable Register has been properly programmed for each port. Supported interrupt events include:

- Received data available
- Transmit buffer empty
- Line Status Register change
- Modem Status Register change

A detailed explanation of serial port interrupts is beyond the scope of this manual. For more information, consult a serial port programming reference.

Note: When the UART clock is running at a higher frequency, transmit/receive interrupts will happen more frequently. Many operating systems can not process interrupts quickly enough to handle this load. When developing your software, be sure to consider the operating system's limitations.

Additional Information

Serial Port Programming

For more information about programming serial port UARTs, consult the following book:

Serial Communications Developer's Guide
By Mark Nielson
ISBN: 0764545701

Interrupt Programming

For more information about interrupts and writing interrupt service routines, refer to the following book:

Interrupt-Driven PC System Design
By Joseph McGivern
ISBN: 0929392507

Exar XR17D158 PCI Bus Octal UART

For detailed information about the Exar XR17D158, contact Exar at:

Web: http://www.exar.com

CM17320HR Board Specifications

Physical Attributes

Size:	3.6”L x 3.8”W x 0.6”H (90mm L x 96mm W x 15mm H)
Weight:	0.24bs (0.10 Kg)
Power Consumption:	2W @ 5 VDC Typical

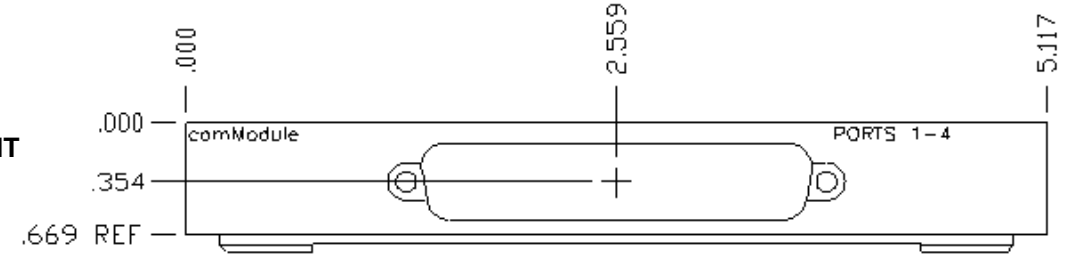
Operating Conditions

Cooling	Convection
Operating temperature range	-40º to +85ºC
Storage temperature range	-55^{o} C to +125^{o} C
Humidity	RH up to 95% non-condensing

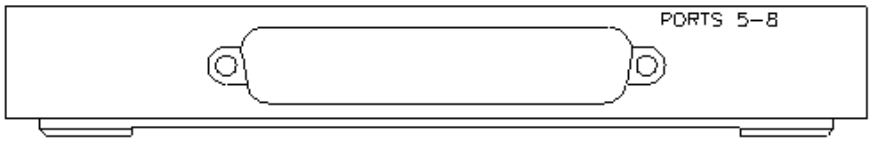
IDAN-CM17320HRS Dimensions and Pinout

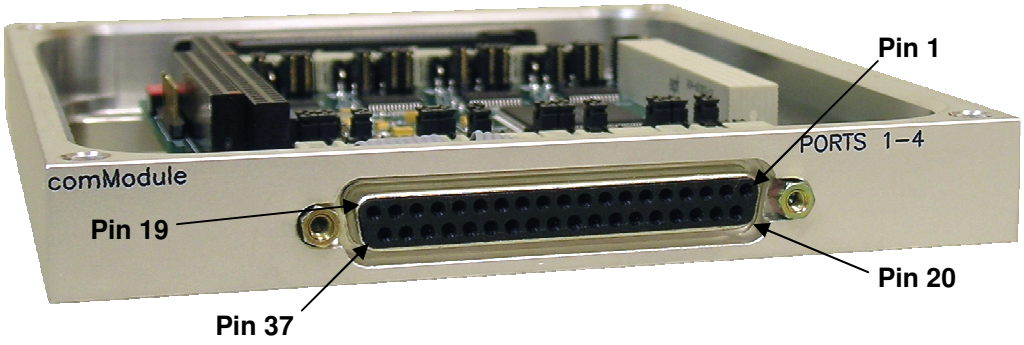
IDAN Frame

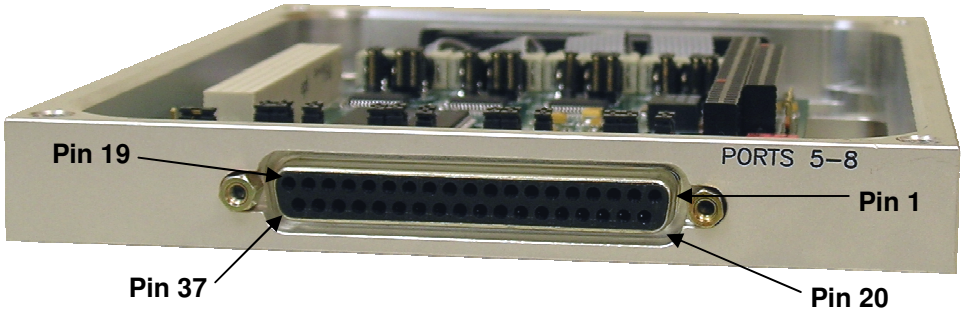
FRONT



BACK







Note: Drawings are not to scale.

IDAN Connectors

37-pin “D” Female Connectors

Connector Part #: Adam Tech DE37SD **Mating Connector:** Adam Tech DE37PD

Serial Ports 1-4 (Front)

	IDAN Pin #	RS-232 Signal	RS-422/485 Signal	CM17320 Pin #	IDAN-XKCM33 Cable Kit 9 Pin "D" Connector (Male)
Serial Port 4	1	Carrier Detect	Request To Send (-)	CN7-1	PORT 4-1
	2	Receive Data	Receive Data (-)	CN7-3	PORT 4-2
	3	Transmit Data	Transmit Data (-)	CN7-5	PORT 4-3
	4	Data Terminal Ready	Clear To Send (-)	CN7-7	PORT 4-4
	5	GND	GND	CN7-9	PORT 4-5
	20	Data Set Ready	Request To Send (+)	CN7-2	PORT 4-6
	21	Request To Send	Transmit Data (+)	CN7-4	PORT 4-7
	22	Clear To Send	Receive Data (+)	CN7-6	PORT 4-8
	23	Ring Indicator	Clear To Send (+)	CN7-8	PORT 4-9
Serial Port 3	24	Carrier Detect	Request To Send (-)	CN6-1	PORT 3-1
	25	Receive Data	Receive Data (-)	CN6-3	PORT 3-2
	26	Transmit Data	Transmit Data (-)	CN6-5	PORT 3-3
	27	Data Terminal Ready	Clear To Send (-)	CN6-7	PORT 3-4
	28	GND	GND	CN6-9	PORT 3-5
	6	Data Set Ready	Request To Send (+)	CN6-2	PORT 3-6
	7	Request To Send	Transmit Data (+)	CN6-4	PORT 3-7
	8	Clear To Send	Receive Data (+)	CN6-6	PORT 3-8
	9	Ring Indicator	Clear To Send (+)	CN6-8	PORT 3-9
Serial Port 2	10	Carrier Detect	Request To Send (-)	CN5-1	PORT 2-1
	11	Receive Data	Receive Data (-)	CN5-3	PORT 2-2
	12	Transmit Data	Transmit Data (-)	CN5-5	PORT 2-3
	13	Data Terminal Ready	Clear To Send (-)	CN5-7	PORT 2-4
	14	GND	GND	CN5-9	PORT 2-5
	29	Data Set Ready	Request To Send (+)	CN5-2	PORT 2-6
	30	Request To Send	Transmit Data (+)	CN5-4	PORT 2-7
	31	Clear To Send	Receive Data (+)	CN5-6	PORT 2-8
	32	Ring Indicator	Clear To Send (+)	CN5-8	PORT 2-9
Serial Port 1	33	Carrier Detect	Request To Send (-)	CN4-1	PORT 1-1
	34	Receive Data	Receive Data (-)	CN4-3	PORT 1-2
	35	Transmit Data	Transmit Data (-)	CN4-5	PORT 1-3
	36	Data Terminal Ready	Clear To Send (-)	CN4-7	PORT 1-4
	37	GND	GND	CN4-9	PORT 1-5
	15	Data Set Ready	Request To Send (+)	CN4-2	PORT 1-6
	16	Request To Send	Transmit Data (+)	CN4-4	PORT 1-7
	17	Clear To Send	Receive Data (+)	CN4-6	PORT 1-8
	18	Ring Indicator	Clear To Send (+)	CN4-8	PORT 1-9
	19	N/C	N/C	N/C	N/C

Serial Ports 5-8 (Back)

	IDAN Pin #	RS-232 Signal	RS-422/485 Signal	CM17320 Pin #	IDAN-XKCM33 Cable Kit 9 Pin "D" Connector (Male)
Serial Port 8	1	Carrier Detect	Request To Send (-)	CN11-1	PORT 8-1
	2	Receive Data	Receive Data (-)	CN11-3	PORT 8-2
	3	Transmit Data	Transmit Data (-)	CN11-5	PORT 8-3
	4	Data Terminal Ready	Clear To Send (-)	CN11-7	PORT 8-4
	5	GND	GND	CN11-9	PORT 8-5
	20	Data Set Ready	Request To Send (+)	CN11-2	PORT 8-6
	21	Request To Send	Transmit Data (+)	CN11-4	PORT 8-7
	22	Clear To Send	Receive Data (+)	CN11-6	PORT 8-8
	23	Ring Indicator	Clear To Send (+)	CN11-8	PORT 8-9
Serial Port 7	24	Carrier Detect	Request To Send (-)	CN10-1	PORT 7-1
	25	Receive Data	Receive Data (-)	CN10-3	PORT 7-2
	26	Transmit Data	Transmit Data (-)	CN10-5	PORT 7-3
	27	Data Terminal Ready	Clear To Send (-)	CN10-7	PORT 7-4
	28	GND	GND	CN10-9	PORT 7-5
	6	Data Set Ready	Request To Send (+)	CN10-2	PORT 7-6
	7	Request To Send	Transmit Data (+)	CN10-4	PORT 7-7
	8	Clear To Send	Receive Data (+)	CN10-6	PORT 7-8
	9	Ring Indicator	Clear To Send (+)	CN10-8	PORT 7-9
Serial Port 6	10	Carrier Detect	Request To Send (-)	CN9-1	PORT 6-1
	11	Receive Data	Receive Data (-)	CN9-3	PORT 6-2
	12	Transmit Data	Transmit Data (-)	CN9-5	PORT 6-3
	13	Data Terminal Ready	Clear To Send (-)	CN9-7	PORT 6-4
	14	GND	GND	CN9-9	PORT 6-5
	29	Data Set Ready	Request To Send (+)	CN9-2	PORT 6-6
	30	Request To Send	Transmit Data (+)	CN9-4	PORT 6-7
	31	Clear To Send	Receive Data (+)	CN9-6	PORT 6-8
	32	Ring Indicator	Clear To Send (+)	CN9-8	PORT 6-9
Serial Port 5	33	Carrier Detect	Request To Send (-)	CN8-1	PORT 5-1
	34	Receive Data	Receive Data (-)	CN8-3	PORT 5-2
	35	Transmit Data	Transmit Data (-)	CN8-5	PORT 5-3
	36	Data Terminal Ready	Clear To Send (-)	CN8-7	PORT 5-4
	37	GND	GND	CN8-9	PORT 5-5
	15	Data Set Ready	Request To Send (+)	CN8-2	PORT 5-6
	16	Request To Send	Transmit Data (+)	CN8-4	PORT 5-7
	17	Clear To Send	Receive Data (+)	CN8-6	PORT 5-8
	18	Ring Indicator	Clear To Send (+)	CN8-8	PORT 5-9
	19	N/C	N/C	N/C	N/C

Limited Warranty

RTD Embedded Technologies, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from RTD EMBEDDED TECHNOLOGIES, INC. This warranty is limited to the original purchaser of product and is not transferable.

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